(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 086 857 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.03.2001 Bulletin 2001/13

(51) Int. Cl.[7]: **B60R 9/042**

(21) Application number: **00308153.6**

(22) Date of filing: **19.09.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **21.09.1999 GB 9922176**

(71) Applicant: **Bri-Stor Systems Ltd.**
Stafford, Staffordshire, ST18 0PF (GB)

(72) Inventors:
- **Brough, Bernard**
  Hixon, Stafford, Staffordshire, ST18 0PF (GB)
- **Kirkwood, James**
  Hixon, Stafford, Staffordshire ST18 0PF (GB)
- **Daykin, Adam Anthony**
  Hixon, Stafford, Staffordshire, ST18 0PF (GB)
- **Skelding, Philip Norman**
  Hixon, Stafford, Staffordshire, ST18 0PF (GB)

(74) Representative:
Swindell & Pearson
48 Friar Gate
Derby DE1 1GY (GB)

(54) Vehicle storage roof rack

(57) A storage rack for a van roof comprising a rail assembly (11), mountable on the van roof, a load carrying trolley (19) movable along the rail assembly (11) from a storage position to a loading position in which the trolley (19) projects beyond the rear end of the rail assembly (11) and is rotated downwards alongside the rear of the van V to allow loading, and a fail safe locking assembly (31) operable from the rear of the van V to lock the trolley (19) in the storage position on the rail assembly (11).

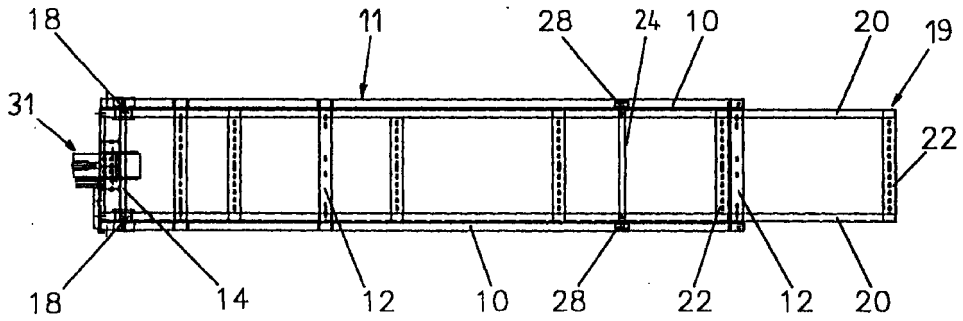


Fig. 1

EP 1 086 857 A2

Description

[0001] The present invention concerns improvements in or relating to storage racks, particularly but not exclusively storage racks for vehicles, for example, panel vans.

[0002] There is a requirement to provide storage for elongate items, for example ladders and bundles of tubes which are too long to be accommodated within the luggage carrying space of a vehicle. This requirement is presently met by storing the items on a rack attached to the roof of the vehicle.

[0003] In certain vans, for example panel vans, the roof is so high from the ground that storing and securing loads on a roof rack presents a safety problem.

[0004] According to the present invention there is provided a storage rack for mounting on an elevated generally horizontal surface, including a rail assembly, mounting means for mounting the rail assembly on the surface, a load carrying trolley movable along the rail assembly from a storage position where one end of the trolley is at one end of the rail assembly to a loading position where said one end of the trolley projects beyond the said one end of the rail assembly and the said surface, rail engaging means mounted on the trolley between its mid point and the other end thereof and trolley supporting guide means at said one end of the rail assembly and supporting the trolley thereon whereby the trolley is movable linearly along the rail assembly from its storage position until said rail engaging means disengage from the rail assembly to enable the trolley to pivot downwardly about the rail engaging means, a locking assembly being provided on the said one end of the trolley and being engageable with complementary means on the rail assembly to hold the trolley in the storage position and lock disengaging means removably engageable with said locking means.

[0005] Preferably the load carrying trolley includes a load carrying platform which extends transversely beyond the rail assembly.

[0006] Preferably load securing means are provided on the load carrying platform.

[0007] Preferably the rail assembly comprises a pair of parallel spaced apart channels with the opening in one channel facing the opening in the other channel.

[0008] Preferably the mounting means are fixable to the rail assembly at a variety of predetermined points to provide for flexibility of mounting of the rail assembly on the surface.

[0009] Preferably the load carrying trolley includes a pair of longitudinally extending members spaced apart from each other at a distance less than the distance between the channels of the rail assembly and including bracing members extending transversely between said elongate members.

[0010] Preferably said rail engaging means are mounted to the side or underside of said members and comprise sliding or rolling elements located within the channels and rotatably mounted to the said members.

[0011] Preferably the trolley supporting guide means comprises a rotatable assembly mounted about an axis extending transversely between the channel members on which the lower surface of said longitudinally extending members engage. Preferably the rotatable assembly comprises flanged wheels rotatably mounted about a transversely extending rail assembly end bar.

[0012] Preferably the locking assembly comprises a catch means engageable with said rail assembly end bar and biased towards a condition in which the bar is locked in position in the catch means.

[0013] Preferably the locking assembly comprises also a latch means including a latch mounted on the trolley and engageable with a keeper fixed to the rail assembly, the latch being biased towards a position where it engages and locks with the keeper.

[0014] Preferably the lock disengaging means comprises an elongate member operable from a position remote from the said one end of the load carrying trolley and removably engageable with the catch and latch means. Preferably mounting means are provided for the lock disengaging means at the end of the load carrying trolley, the mounting means being adapted to maintain engagement of the disengaging means with the locking assembly when the catch and latch assemblies are in an open position.

[0015] Preferably the catch means comprises a ramp member fixed at the end of the load carrying trolley and presenting a downwardly directed rail assembly end bar engaging surface extending in the direction of said one end of the trolley to said other end and a hook member pivotally mounted on said ramp member and presenting an upwardly inclined surface leading from a bar engaging hook, means being provided on said hook member such that its inclined surface is biased towards the inclined surface of the ramp member thereby providing for entrapment of the rail assembly end bar in the hook between the ramp and hook members.

[0016] Preferably an operating arm extends from the end of said hook member on its side opposite from the hook said operating arm including engagement surfaces for selective engagement with the lock disengaging means.

[0017] Preferably the latch of the latch means is pivotally mounted about an axis parallel to the elongate axis of the load carrying trolley and engageable with the slotted keeper fixed to the rail assembly at its outer end. Preferably the latch has an extension at its inner end provided with means for selective engagement by the lock disengaging means.

[0018] Preferably the lock disengaging means includes a tube engageable over a rod projecting downwardly and outwardly from the said one end of the load carrying trolley whereby the disengaging means can be fitted over said rod and rotated and moved axially relative thereto, the disengaging means having a first trans-

verse finger adapted on rotation to engage the selective engagement means on the extension of the latch and at least one shorter finger adapted to engage the extension from the hook member of the catch means whereby on rotation of the disengaging means the latch is disengaged from its keeper and on axial movement of the disengaging means along the rod away from the said one end of the trolley means the hook member is disengaged from the rail assembly end bar.

[0019] Preferably a guide plate is provided on the end of the ramp member, the guide plate having a slot therein to permit removal of the lock engaging means from the downwardly extending bar only when the fingers are rotated sufficiently out of engagement with the catch and latch means.

[0020] Preferably an end stop in said guide plate slot(s) prevents excessive axial movement of the lock disengaging means along said downwardly directed bar.

[0021] Preferably a gas strut is connected to the trolley to control its pivotal movement.

[0022] Preferably the trolley includes a means of aiding the loading of the trolley comprising a winch and strap mounted on the trolley, the strap ending in a hook which may engage with the load to be lifted. Preferably the winch includes a fail-safe locking arrangement whereby the winch will not rotate in the normal position.

[0023] Preferably the lockable winch arrangement comprises a bar with a handle, a reel mounted on the bar, the bar rotatably mounted on side plates fixed to the trolley, a top plate supported by the side plates with an aperture through which the reel protrudes, at least one radially extending pin mounted on the bar and having a length greater than the clearance between the bar and the top plate, a spring which biases the reel towards a side of the aperture in which position the pair of pins lie below the top plate and prevent rotation of the bar by abutment of the pin or pins with the top plate, the pin or pins being movable against the spring bias into the aperture to allow rotation of the reel.

[0024] Alternatively the trolley includes a means of aiding the loading of the trolley comprising a crank assembly mounted on the trolley. Preferably the crank assembly comprises side plates fixed to the trolley, a bar with a handle rotatably mounted on the side plates, two arms fixed to the bar, and a U-shaped ladder rung receiving channel rotatably mounted between the two arms.

[0025] Preferably a forward trolley and ladder securing assembly is provided comprising a mounting means for mounting the assembly on the elevated generally horizontal surface, a support means mounted on the mounting means to support a forward part of the trolley and ladder, a securing member connected to one side of the support means and selectively positionable, and a locking means operating on the securing member to lock the securing member in position over the said forward part of the trolley and ladder.

[0026] Preferably the support means comprises side supporting members fixed to the mounting means and a horizontal supporting means mounted on the side supporting members.

[0027] Preferably the outermost side supporting members project above the topmost level of the horizontal supporting means.

[0028] Preferably the horizontal supporting means includes at least one roller, rotatably mounted on the side supporting members.

[0029] Preferably the securing member is pivotally connected to one of the side supporting members.

[0030] Preferably the locking means includes a lower connecting member pivotally connected to said side supporting member, an upper connecting member pivotally connected to the lower connecting member and to the said securing member, a mounting bracket pivotally connected to the upper and lower connecting members at their junction, the upper and lower connecting members, the securing member and the said side supporting member in use providing a toggle clamp enabling the securing member to be locked in position over the forward part of the ladder and trolley.

[0031] Preferably the mounting bracket is adapted to selectively maintain engagement of the lock disengaging means.

[0032] An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Fig. 1 shows a view from above of a storage rack;
Fig. 2 shows a side view;
Fig. 3 shows a view from one end;
Fig. 4 shows a plan view of said one end;
Fig. 5 shows a side view of one end of a lock disengaging means;
Figs. 6 to 9 show a side view of one end of the storage rack in different operating positions,
Fig. 10 shows an end view of the storage rack incorporating a modification;
Figs. 11 and 12 show respectively partial side views of the modified rack in its storage and unloading position;
Figs. 13 and 14 show plan and side views respectively of the load carrying trolley including a loading winch;
Figs. 15 and 16 show side and plan views respectively of the winch in the locked position;
Figs. 17 and 18 show side and plan views respectively of the winch in the operational position;
Figs. 19 and 20 show plan and side views respectively of the load carrying trolley including a crank arm for loading;
Figs. 21a to 21c show sequential side views of a ladder being loaded onto a vehicle; and
Figs. 22 and 23 show end views of a forward trolley and ladder securing assembly in the open and locked positions respectively.

[0033] The storage rack described in this non-limiting embodiment is intended for mounting on the top of a van known as a panel van, that is a van having a relatively high roof, normally greater than the height of the driver/crew of the van, thereby providing roof access problems.

[0034] The rack comprises a rail assembly having a pair of inwardly facing channels 10 fixed in position relative to each other by transverse cross-members 12. The channels 10 and cross-members 12 have apertures therethrough at frequent intervals to which can be attached by suitable fixing means, for example nuts and bolts, a plurality of mounting means (not shown in the drawings for sake of clarity) by which the rail assembly can be rigidly fixed to the roof of a van with the longitudinal axes of the assembly running in the fore and aft direction of the van.

[0035] As most clearly illustrated in Fig. 4, a circular section rail assembly end bar 14 is mounted in brackets 16 fixed to the channels 10 and carries, at each end, a flanged plastics material roller 18 rotatably mounted on the bar.

[0036] A load carrying trolley 19 is mounted between the channels 10 and comprises a pair of parallel longitudinally extending members 20 fixed together by transverse bracing members 22. The underside of the members 20 rest on and are movable over the rollers 18 and at a point on the side members spaced from the front end thereof there is mounted a cross member 24 having rollers 28 rotatably mounted thereon, the rollers being located outside the members 20 and within the channels 10 such that if the load carrier is unrestrained it can move over the rail assembly guided by the rollers 18 and 28.

[0037] If the load carrying trolley is moved to the left, as viewed in Figs. 1 and 2, it will be appreciated that it can readily travel over the rail assembly, being guided between the channels 10 so that its one (rear) end projects beyond the end of the rail assembly. This movement can continue until the rollers 28 about an end stop 29, as shown in Fig. 12, when the axis of rotation of the rollers has passed beyond the axis of the end bar roller 18 at which stage the trolley can be pivoted about the rollers 28, that is the rear end of the trolley can be lowered towards or onto the ground. In this inclined position, which may be fairly close to the vertical (at the rear of the vehicle to which the rack is fitted), it is a relatively easy task to fit and secure items, for example ladders, to the trolley and for this purpose load attachment means are provided on the trolley. These are not shown in the drawings but may comprise ropes attached to the uppermost bracing member 22 and ladder engaging hooks attached to an intermediate bracing members 22.

[0038] Figs. 21a to Fig. 21c show a sequence of side views in which a ladder L is loaded onto a vehicle V by means of the load carrying trolley 19. In Fig. 21a, a ladder L is laid against the load carrying trolley 19, which is shown in the lowermost loading position at the back of the vehicle V. In Fig. 21b the ladder L has been secured in position on the load carrying trolley 19. In Fig. 21c the load carrying trolley 19 has been raised onto the top of the vehicle V and is shown in the secured travelling position.

[0039] It will be noticed in Figs. 21a to 21c that there is a strap 80 to limit the amount of pivotal movement of the trolley relative to the rails assembly, the strap 80 being formed from a webbing and being attached between the front end bracing member 22 of the trolley 19 and a suitable cross-member 12 of the rail assembly.

[0040] It will be realised that anyone loading the storage rack in its lowermost position does so from a relatively safe spot behind the vehicle and that he can load the trolley without having to over-stretch or climb to gain access to the top of the van. He can also secure the load on the trolley from this relatively safe ground position.

[0041] After the load has been secured the trolley is pivoted upwardly about the axis of rollers 28 and it can then be pushed over the top of the van into the storage position shown in Figs. 1, 2 and 21c.

[0042] It will be realised that it is important to be able to readily lock the trolley in the storage position such that it is secure when the van is moving. This is achieved by a locking assembly located at the rear end of the trolley and engaging with corresponding members fixed to the rear end of the rail assembly.

[0043] The locking assembly is best illustrated in Figs. 3 to 9. It comprises two elements namely a catch means and a latch means. The latch means will be described first and can be seen most clearly in Figs. 3 and 4. It comprises a latch 30 pivotally mounted to the rear bracing member 22 of the trolley. It is spring or gravity biased in the clockwise direction as viewed in Fig. 3. A keeper 32 (see also Fig. 6) is fixed to the end of the channel 10 and has an upwardly directed slot 34 (Fig. 8) to receive the latch. Obviously, to free the latch it is necessary to pivot it in an anti-clockwise direction and this is achieved by means of an extension 38 which carries an operating rod 40. It will be appreciated that downward movement of the rod 40 causes disengagement of the latch from the keeper. How this is achieved will be described below.

[0044] The second element of the locking assembly comprises a catch means including a pair of spaced ramp members 42 fixed to the underside of the load carrying trolley and having two forward projections 44 defining ramp surfaces which are inclined downwardly away from the rear end of the trolley. Pivotally mounted between the first members 42 is a hook member 46 spring or gravity biased in the clockwise direction as viewed in Figs. 6 to 9. The hook member 46 is rotatable about a pivot axis 48 and has a rearwardly extending operating arm 50. One of the fixed members 42 has a rearwardly directed extension 42' which has an inclined slot 68 formed therein, the slot opening upwardly.

[0045] A circular section rod 54 is fixed to and

extends rearwardly and downwardly from the end cross-member 22 of the trolley.

[0046] Fig. 6 shows the catch means in its locking position where the end of an inclined surface 53 on the end of the hook member 46 and leading to the hook 56 has its inner end overlapping the ramp members 42 so that the bar 14 at the end of the rail assembly can be held in the hook and locked between the ramp and hook members.

[0047] To release the bar to permit movement of the trolley along the rails it is necessary to pivot the hook member 46 in the anti-clockwise direction illustrated by arrow B in Figs. 7 and 8. This movement is achieved by a removable lock disengaging member 60, the upper end of which is shown in Figs. 5 to 9. The disengaging member 60, at its upper tabular end has a first radially extending finger 62 and spaced therebelow a pair of diametrically oppositely extending shorter fingers 64. The hollow end can be fitted in the direction of arrow A (Fig. 6) over the rod 54. It is fitted over the rod with the finger 62 directed upwardly, that is at 90° to the orientation shown in Figs. 6 to 9. In this orientation it is able to pass between the extension 42' but the first finger cannot engage the rod 40 or the operating arm 50 until it is rotated through 90° and this is permitted by providing a first upwardly opening slot 66 Figs. 7 and 8) in the extension 42'. An outwardly and downwardly inclined slot 68 capable of accommodating finger 62 is also formed in the extension 42' leading rearwardly, downwardly from slot 66 and it will be appreciated that in the orientation illustrated in Figs. 6 to 8, when the disengaging member 60 is moved over the bar 54 away from the trolley its outward movement is ended on abutment of the finger 62 with the bottom of the slot 68.

[0048] Figs. 6 and 7 show that the fingers 64 abut the operating arm 50 of the hook member 46 so that axial movement of the disengaging member 60 in the direction of arrow C (Figs. 7 and 8) pivots the hook member 46 in an anti-clockwise direction to lift the hook to release the rail assembly end rod 14. Fig. 7 shows that the longer finger 62 after partial travel of the member 60 in the direction of arrow C, abuts the rod 40 projecting from the latch 38. Further movement in the direction of arrow C to the end-most position illustrated in Fig. 8 shows that the latch is rotated to release it from the notch 34 in keeper 32. In this condition both elements of the locking mechanism are released so that a pull on the disengaging member 60 in the direction of arrow D (Fig. 9) commences movement of the load carrying trolley relative to the rail assembly away from the storage position, as described earlier in the specification.

[0049] It will be realised that movement in directions opposite from the arrows illustrated in the drawing will cause the load carrying trolley to return to its storage position and as it reaches it the latch and catch means will automatically engage owing to their spring biasing. It is only in the engaged condition that the member 60 can be released such that it provides a tell-tale to the operator warning him if the catch and lock means are not engaged.

[0050] Various modifications can be made without departing from the scope of the invention, one of which is to provide an extended load carrying surface by providing a load platform attached to the load carrying trolley. This enables, for example, a pair of ladders to be mounted side by side or a ladder to be mounted alongside other elongate cargo, for example bundles of tubes, carpets, poles etc. Hitherto storage racks have been capable of carrying only a single ladder so that the rack described above, with its capability of carrying two ladders, presents a valuable improvement over existing arrangements. The rack can be loaded and unloaded safely by the person from a position at ground level behind the vehicle.

[0051] The locking assembly can be modified but it is important that it comprises two elements and that the elements are self locking. The trolley can be adapted to carry other loads, for example small boats, bicycles.

[0052] Figs. 10, 11 and 12 show a further modification where the pivotal movement of the trolley relative to the rail assembly is controlled, that is effectively counter-balanced by a gas strut and more particularly a pair of gas struts arranged alongside each trolley longitudinal member 20.

[0053] The gas struts 71 are proprietary products and will not be described in any detail. It will be understood that they will be chosen to provide a resistance to extension and an assistance to contraction which is designed to counter-balance the downwards arid upwards pivotal movement of the trolley respectively. The piston end of each gas strut 71 is pivotally mounted to a truss like strut carrier 70 which, in turn, is pivotally mounted at its rear end about an axis 73 to the side member 20 of the trolley. The free end of the piston 74 of the gas strut 71 is also pivotally mounted about an axis 75 to the side member 20. The mounting to the side members is by way of a mounting plate 72.

[0054] The carrier 70, near to its forward end has a cross member 76 attached to its underside, the cross-member 76 carrying auxiliary rollers 28' at its outer end, the rollers 28' being mounted in the channels 10 of the rail assembly.

[0055] Fig. 11 shows the gas strut in its retracted position when the trolley is in the storage position illustrated in Figs. 1 and 2. Fig. 12 shows the trolley in its downwardly pivoted position with the gas strut extended. It will be realised that the piston 74 of the gas strut will be retracted from the cylinder as the trolley pivots about the axis of roller 28, this extension counterbalancing the downward pivotal forces exerted by the trolley. Similarly, upwards pivotal movement of the trolley from the position shown in Fig. 12 to an approximately horizontal attitude will be assisted by retraction of the gas strut.

[0056] In another modification, means for aiding the

loading of the ladder onto the trolley are provided. One such means, a winch and strap arrangement, is shown in Figs. 13 to 18. The winch and strap arrangement includes a strap 82 attached to a reel 86, fixed to a circular section bar 88, rotatably mounted in side plates 98 which are fixed to the longitudinally extending members 20 of the load carrying trolley 19. At the free end of the strap 82 is a strap hook 84. A handle 92 is fixed at one end to the rotating bar 88. A top plate is fixed to the side plates 98, and includes a rectangular aperture 100 through which protrudes a part of the reel 86. A coiled spring 94 is mounted on the circular section bar 88 and extends between the reel 86 and a side plate 98. A pair of diametrically opposed radially extending pins 90 is located on the bar 88 between the reel 86 and the side plate 98 on the same side of the reel 86 as the handle 92, and close to the reel 86. The pins 90 are longer than the clearance distance between the bar 88 and the top plate 96.

[0057] The winch includes a drum locking means. Figs. 15 and 16 show the winch in the locked position. The spring 94 biases the reel 86 against a side of the aperture 100. In this position the pins 90 are underneath the top plate 96 and because the clearance distance between the bar 88 and the top plate 96 is less then the length of the pins 90, the bar 88 is prevented from rotating and hence the reel and strap are locked.

[0058] Figs. 17 and 18 show the winch in the operating position. To operate the winch it is necessary to apply and maintain an axially directed force on the handle 92 in the direction of the arrow E in Fig. 18. The force acts against the spring element 94, and moves the reel 86 across the aperture 100. The pins move from under the top plate 96 into the aperture 100. In this position the bar 86 can rotate freely, the handle 92 can be operated, and the strap 82 can be wound in or out.

[0059] The method of loading of a load such as a ladder is as follows. With the load carrying trolley in its lowermost loading position (as shown in Fig. 21a), a ladder L is laid against the trolley 19. The winch handle 92 is pushed against the spring 94 to release the pins 90, and then turned to pay out the strap 82. The strap hook 84 is hooked underneath a rung of the ladder and the winch handle 92 axially pushed and turned to wind in the strap 82, lifting the ladder L off the ground. When the ladder L has been raised fully on to the loading trolley 19 the winch handle 92 is released so that the pins 90 move back underneath the top plate 96, locking the winch against rotation. The operation of the spring 94 in this manner ensures that the locked position is the failsafe or normal position. Once in a position on the loading trolley 19 the ladder L is further secured by means of a clamp or straps (not shown) to the trolley 19. The trolley 19 is then pushed on to the top of the vehicle V as shown in Fig. 21c, and the catch and latch arrangements operate to secure the loading trolley in its travelling position.

[0060] An alternative means of loading a ladder onto the trolley, a crank assembly, is shown in Figs. 19 and 20. A U-shaped channel 110 is rotatably mounted between two arms 112, which are fixed to a circular cross-section bar 114. The bar 114 is rotatably mounted to side plates 118, and on one side extends through the side plates 118 to a handle 116. The side plates 114 are fixed to the longitudinally extending members 20 of the load carrying trolley 19, at a position towards the lower end of the trolley 19 when the trolley 19 is in its lowermost loading position.

[0061] The method of operation of the crank assembly loading means is as follows. With the load carrying trolley 19 in its lowermost loading position (as shown in Fig. 21a) and the crank assembly also in its lowermost position, a ladder L is laid against the trolley 19, and a rung of the ladder L engaged with the U-shaped channel 110. The handle 116 is swung upwards, which rotates the channel 110 upwards through an arc as shown by the arrows F in Fig. 20, lifting the ladder L up from the ground and into position against the trolley 19 (Fig. 21b). The ladder L is secured by means of a clamp or straps to the trolley 19, and the trolley 19 pushed onto the top of the vehicle V. The catch and latch arrangements operate to secure the loading trolley in its travelling position.

[0062] In another modification, a means for securing the forward part of the ladder is provided as shown in Figs. 22 and 23. The ladder securing assembly 130 includes a mounting cross member 150 which is attachable to the vehicle. Side supporting members 134, 136 and 148 are fixed to the cross member 150, and rollers 132 are rotatably mounted on the side supporting members 134, 136 and 148. Side supporting members 134 and 160 project above the topmost level of the rollers 132. Securing arm 138 is fixed to securing arm side member 140, which is pivotally connected at pivot 160 to side supporting member 134. Lower connecting member 146 is pivotally connected at one end to side supporting member 134 at pivot 158 and is pivotally connected at its other end to one end of upper connecting member 142 and the support bracket 156; the upper connecting member 142 is pivotally connected at its upper end to the securing arm side member 140. The support bracket 156 is pivotally connected at one end to the upper connecting member 142 and the lower connecting member 146, and at the other end to a circular section rod 152. On one side only the bracket 156 has an extension 144, parallel to and spaced apart from the rod 152. The extension 144 has a slot 154 which runs from the upwardly and outwardly facing edge of the extension in an inward downward and then an outward downward direction. The arrangement of the slot 154, the extension 144 and the rod 152 is similar to that previously described for slot 66, extension 42^1 and rod 54.

[0063] In use the ladder securing assembly 130 is mounted on the vehicle separate to and forward of the storage rack previously described. Fig. 22 shows the open loading position. A ladder L is loaded onto the load

carrying trolley 19 at the back of the vehicle V, and the trolley 19 pushed onto the top of vehicle V. The trolley 19 and the ladder L may project forward of the channels 10 and onto the rollers 132, guided by the upward projections of side supporting members 136 and 134. The rollers 132 allow easy movement of the ladder L and trolley 19. The rear end of the trolley 19 is locked in position by the latch means and catch means described previously. The front end of the trolley and the ladder then may be secured as follows. The removable lock disengaging member 60 with the radially extending finger 62, shown in Fig. 5 is placed over the rod 152 and the member 60 rotated so that the finger 62 seats in the slot 154. The disengaging member 60 is pushed in the direction shown by the arrow G in Fig. 22 so that the bracket 156 is moved upwards and inwards. The connecting members 146 and 142 move upwards and rotate about pivot 158, in turn causing the securing arm side member 140 to rotate upwards about pivot 160. Securing arm 138 moves over the ladder L and down to the securing position as shown in Fig. 23. It will be noticed in Fig. 23 that the combined length of the upper connecting member 142 and the lower connecting member 146 are slightly greater than the securing arm side member 140. This provides a toggle clamp effect which ensures that the load is locked securely in position while travelling.

[0064] Releasing the ladder L and trolley 19 is a reverse process of the above.

[0065] The embodiments described offer considerable advantages over prior arrangement. These include a fixed ladder storage system which requires access to and from the roof. A relatively small improvement of this basic system is a roof mounted rack where ladders are mounted using a rope and pulley system operated from ground level. This does not eliminate all the health and safety hazards as it is still necessary for the operative to climb onto the roof to secure and release the ladders.

[0066] A proposal made with a view to eliminating some of the disadvantages of earlier systems is a side loading system. This is relatively complex and expensive and involves the operative standing by the side of the vehicle which is often a hazardous position. Additionally a side loading system requires the operative to lift the ladders or other load through some considerable distance and before they are secured to the rack.

[0067] The storage rack described in the embodiment is relatively cheap compared with existing systems. It is very flexible in respect of the size and type of load it can carry. It is a relatively simple design with a minimal number of easily replaceable components, its weight is relatively low, its fitting is flexible so that it is suitable for use on a wide range of vehicles. It provides a secure and positive load securing system and it is simple to operate by a single person.

Claims

1. A storage rack for mounting on an elevated generally horizontal surface, characterised in that the storage rack includes a rail assembly (11), mounting means for mounting the rail assembly (11) on the surface, a load carrying trolley (19) movable along the rail assembly (11) from a storage position where one end of the trolley (19) is at one end of the rail assembly (11) to a loading position where said one end of the trolley (19) projects beyond the said one end of the rail assembly (11) and the said surface, rail engaging means (28) mounted on the trolley (19) between its mid point and the other end thereof and trolley supporting guide means (18) at said one end of the rail assembly (11) and supporting the trolley (19) thereon whereby the trolley (19) is movable linearly along the rail assembly (11) from its storage position until said rail engaging means (28) disengage from the rail assembly (11) to enable the trolley (19) to pivot downwardly about the rail engaging means (28), a locking assembly (31,30) being provided on the said one end of the trolley (19) and being engageable with complementary means on the rail assembly to hold the trolley (19) in the storage position and lock disengaging means (60) removably engageable with said locking means (31).

2. A storage rack as claimed in claim 1, characterised in that the load carrying trolley (19) includes a load carrying platform which extends transversely beyond the rail assembly.

3. A storage rack as claimed in claim 2, characterised in that load securing means are provided on the load carrying platform.

4. A storage rack as claimed in any of the preceding claims, characterised in that the rail assembly (11) comprises a pair of parallel spaced apart channels (10) with the opening in one channel (10) facing the opening in the other channel (10).

5. A storage rack as claimed in claim 4, characterised in that the mounting means are fixable to the rail assembly (11) at a variety of predetermined points.

6. A storage rack as claimed in any of the preceding claims, characterised in that the load carrying trolley (19) includes a pair of longitudinally extending members (20) spaced apart from each other at a distance less than the distance between the channels (10) of the rail assembly and including bracing members (22) extending transversely between said elongate members (20).

7. A storage rack as claimed in claim 6, characterised in that the rail engaging means (28) are mounted to the side or underside of said longitudinally extending members (20) and comprise rolling elements

(28) located within the channels (10) and rotatably mounted to the said members (20).

8. A storage rack as claimed in claim 6, characterised in that the rail engaging means (28) are mounted to the side or underside of said longitudinally extending members (20) and comprise sliding elements located within the channels (10) and rotatably mounted to the said members (20).

9. A storage rack as claimed in any of the preceding claims, characterised in that the trolley supporting guide means (18) comprises a rotatable assembly (18) mounted about an axis (14) extending transversely between the channel members (10) on which the lower surface of said longitudinally extending members (20) engage.

10. A storage rack as claimed in claim 9, characterised in that the rotatable assembly (18) comprises flanged wheels (18) rotatably mounted about a transversely extending rail assembly end bar (14).

11. A storage rack as claimed in any of the preceding claims, characterised in that the locking assembly (31) comprises a catch means (42,46,50,56) engageable with said rail assembly (11) and biased towards a condition in which said rail assembly (11) is locked in position in the catch means (42,46,50,56).

12. A storage rack as claimed in any preceding claim, characterised in that the locking assembly comprises a latch means (30,32,38,40) including a latch (30) mounted on the trolley (19) and engageable with a keeper (32) fixed to the rail assembly (11), the latch (30) being biased towards a position where it engages and locks with the keeper (32).

13. A storage rack as claimed in any of the preceding claims, characterised in that the lock disengaging means (60) comprises an elongate member (60) operable from a position remote from the said one end of the load carrying trolley (19) and removably engageable with the locking assembly (31).

14. A storage rack as claimed in claim 13, characterised in that mounting means (54) are provided for the lock disengaging means (60) at the end of the load carrying trolley (19), the mounting means (54) being adapted to maintain engagement of the disengaging means (60) with the locking assembly (31) when in an open position.

15. A storage rack as claimed in claim 11, characterised in that the catch means (42,46,50,56) comprises a ramp member (42) fixed at the end of the load carrying trolley (19) and presenting a downwardly directed rail assembly end bar engaging surface (44) extending in the direction of said one end of the trolley (19) to said other end and a hook member (46) pivotally mounted on said ramp member (42) and presenting an upwardly inclined surface (53) leading from a bar engaging hook (56), means being provided on said hook member (46) such that its inclined surface (53) is biased towards the inclined surface (44) of the ramp member (42) thereby providing for entrapment of the rail assembly end bar (14) in the hook between the ramp (42) and hook members (46).

16. A storage rack as claimed in claim 15, characterised in that an operating arm (50) extends from the end of said hook member (46) on its side opposite from the hook (56), said operating arm (50) including engagement surfaces for selective engagement with the lock disengagement means (60).

17. A storage rack as claimed in claims 12 to 14, characterised in that the latch (30) of the latch means (30,32,38,40) is pivotally mounted about an axis parallel to the elongate axis of the load carrying trolley (19) and engageable with the slotted keeper (32) fixed to the rail assembly (11) at its outer end.

18. A storage rack as claimed in claim 17, characterised in that the latch (30) has an extension (38) at its inner end provided with means (40) for selective engagement by the lock disengaging means (60).

19. A storage rack as claimed in claims 13,14,17 and 18, characterised in that the lock disengaging means (60) includes a tube (60) engageable over a rod (54) projecting downwardly and outwardly from the said one end of the load carrying trolley (19) whereby the disengaging means (60) can be fitted over said rod (54) and rotated and moved axially relative thereto, the disengaging means (60) having a first transverse finger (62) adapted on rotation to engage the selective engagement means (40) on the extension (38) of the latch (30) and at least one shorter finger (64) adapted to engage the extension (50) from the hook member (46) of the catch means (42,46,50,56) whereby on rotation of the disengaging means (60) the latch (30) is disengaged from its keeper (32) and on axial movement of the disengaging means (60) along the rod (54) away from the said one end of the trolley means (19) the hook member (46) is disengaged from the rail assembly end bar (14).

20. A storage rack as claimed in claims 15 and 16, characterised in that a guide plate (42') is provided on the end of the ramp member (42), the guide plate (42') having a slot (66,68) therein to permit removal of the lock disengaging means (60) from

the downwardly extending bar (54) only when the fingers (62) are rotated sufficiently out of engagement with the catch and latch means.

21. A storage rack as claimed in claim 20, characterised in that an end stop in said guide plate slot(s) (68) prevents excessive axial movement of the lock disengaging means (60) along said downwardly directed bar (54).

22. A storage rack as claimed in any of the preceding claims, characterised in that a gas strut (71) is connected to the trolley (19) to control its pivotal movement.

23. A storage rack as claimed in any of the preceding claims, characterised in that the trolley (19) includes a means of aiding the loading of the trolley comprising a winch (86,88,92) and strap (82) mounted on the trolley (19), the strap (82) ending in a load engagement means (84).

24. A storage rack as claimed in claim 23, characterised in that the winch (86,88,92) includes a fail-safe locking arrangement (90,94,100) to selectively prevent rotation thereof.

25. A storage means as claimed in claim 24, characterised in that the lockable winch arrangement (86,88,92) comprises a bar (88) with a handle (92), a reel (86) mounted on the bar (88), the bar (88) rotatably mounted on side plates (98) fixed to the trolley (19), a top plate (96) supported by the side plates (98) with an aperture (100) through which the reel (86) protrudes, at least one radially extending pin (90) mounted on the bar (88) and having a length greater than the clearance between the bar (88) and the top plate (96), a spring (94) which biases the reel (86) towards a side of the aperture (100) in which position the pair of pins (90) lie below the top plate (96) and prevent rotation of the bar (88) by abutment of the pin or pins (90) with the top plate (96), the pin or pins (90) being movable against the spring bias into the aperture (100) to allow rotation of the reel (86).

26. A storage rack as claimed in any of claims 1 to 21, characterised in that the trolley (19) includes a means of aiding the loading of the trolley (19) comprising a crank assembly (110,112,114,116,118) mounted on the trolley (19).

27. A storage rack as claimed in claim 26, characterised in that the crank assembly (110,112,114,116,118) comprises side plates (118) fixed to the trolley (19), a bar (114) with a handle (116) rotatably mounted on the side plates (118), two arms (112) fixed to the bar (114), and a U-shaped ladder rung receiving channel (110) rotatably mounted between the two arms (112).

28. A storage rack as claimed in any of the preceding claims, characterised in that a forward trolley and ladder securing assembly (130) is provided comprising a mounting means (150) for mounting the assembly (130) on the elevated generally horizontal surface, a support means (132,134,136,138) mounted on the mounting means (150) to support a forward part of the trolley (19) and ladder (L), a securing member (138,140) connected to one side of the support means (132,134,136,138) and selectively positionable, and a locking means (142,146,156) operating on the securing member (138,140) to lock the securing member (138,140) in position over the said forward part of the trolley (19) and ladder (L).

29. A storage rack as claimed in claim 28, characterised in that the support means comprises side supporting members (134,136,148) fixed to the mounting means (150) and a horizontal supporting means (132) mounted on the side supporting members (134,136,148).

30. A storage rack as claimed in claim 29, characterised in that the outermost side supporting members (134,136) project above the topmost level of the horizontal supporting means (132).

31. A storage rack as claimed in claims 29 and 30, characterised in that the horizontal supporting means (132) includes at least one roller (132), rotatably mounted on the side supporting members (134,136,148).

32. A storage rack as claimed in claims 28 to 31, characterised in that the securing member (138,140) is pivotally connected to one of the side supporting members (134).

33. A storage rack as claimed in claims 28 to 32, characterised in that the locking means (142,146,156) includes a lower connecting member (146) pivotally connected to said side supporting member (134), an upper connecting member (142) pivotally connected to the lower connecting member (146) and to the said securing member (134), a mounting bracket (156) pivotally connected to the upper and lower connecting members (142,146) at their junction, the upper and lower connecting members (142,146), the securing member (138,140) and the said side supporting member (134) in use providing a toggle clamp enabling the securing member (138,140) to be locked in position over the forward part of the ladder (L) and trolley (19).

34. A storage rack as claimed in claim 33, characterised in that the mounting bracket (156) is adapted to selectively maintain engagement of the lock disengaging means (60).

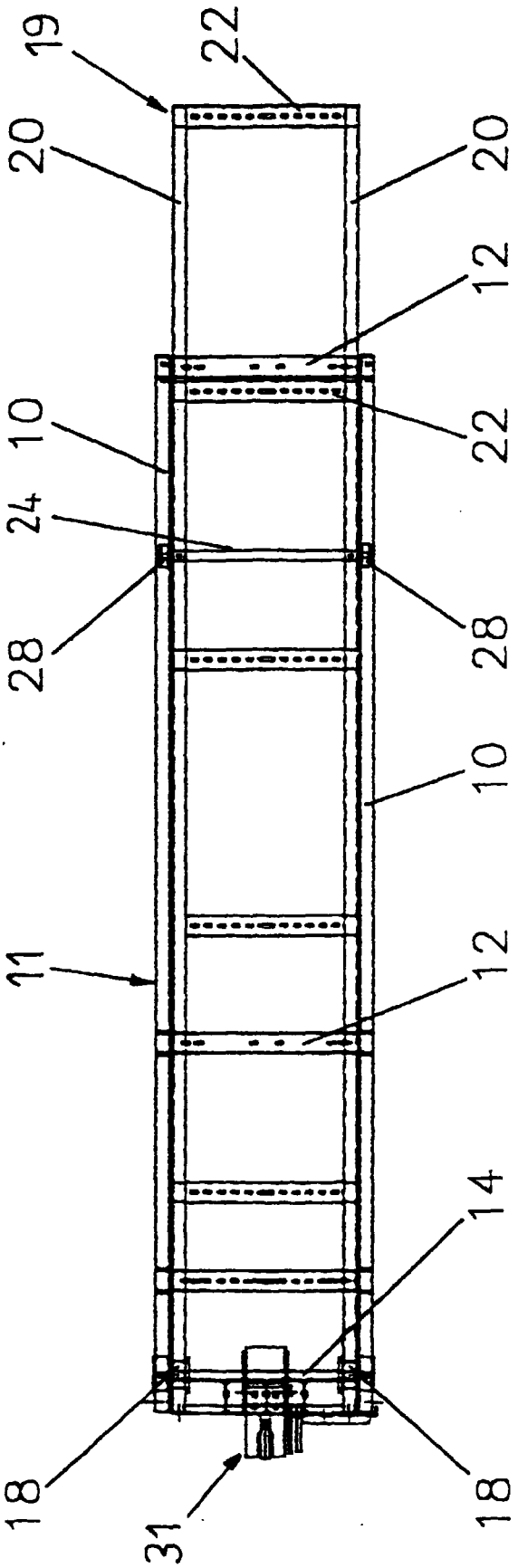


Fig. 1

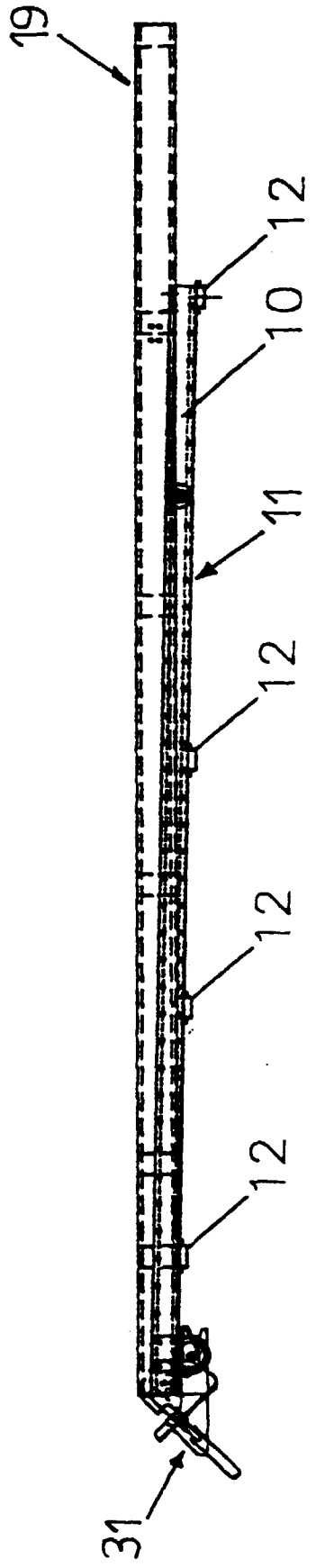


Fig.2

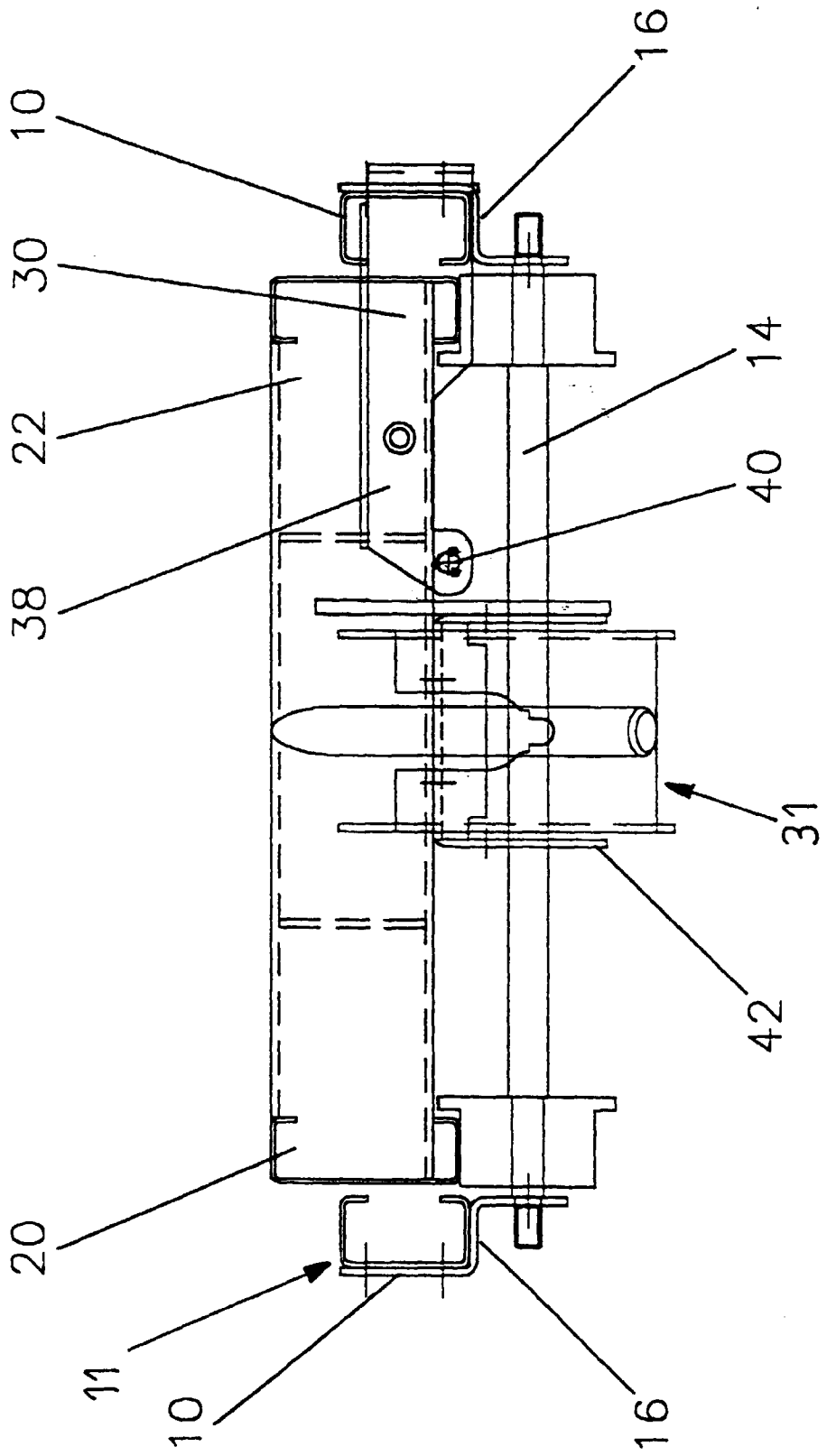


Fig. 3

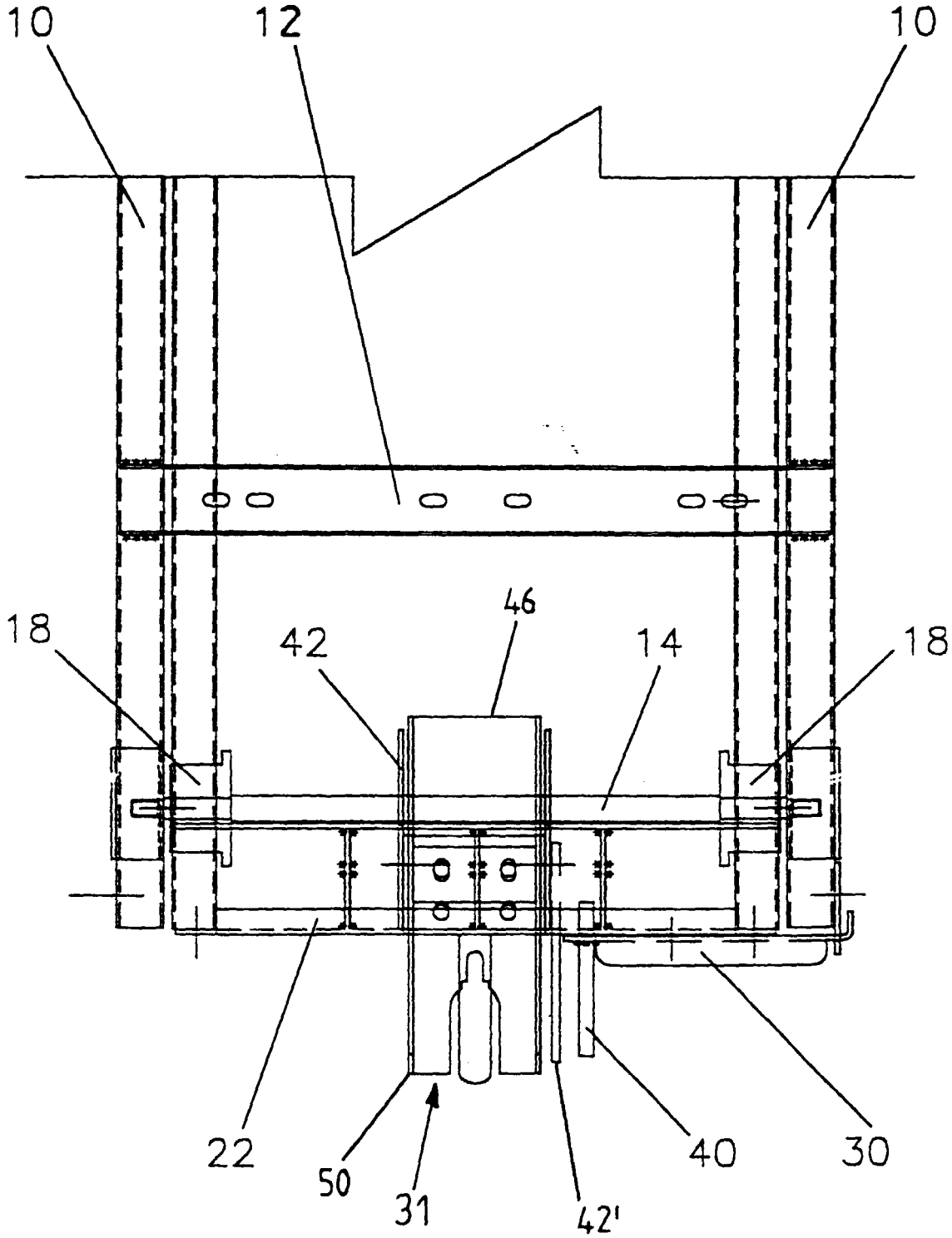


Fig.4

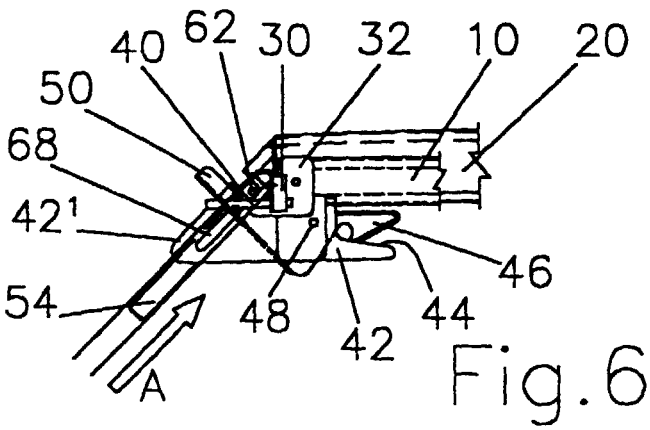


Fig.6

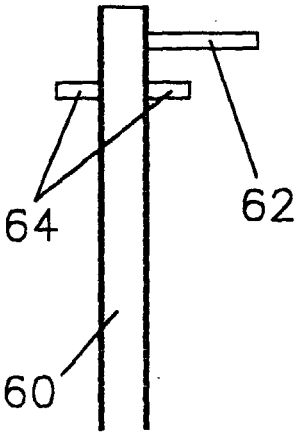


Fig.5

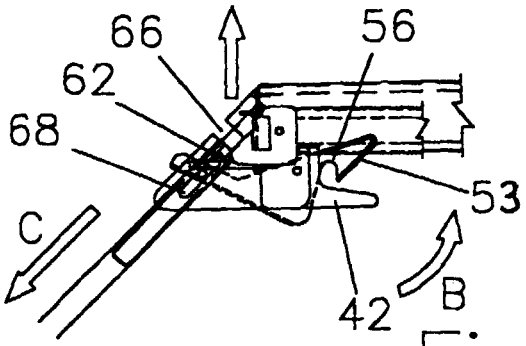


Fig.7

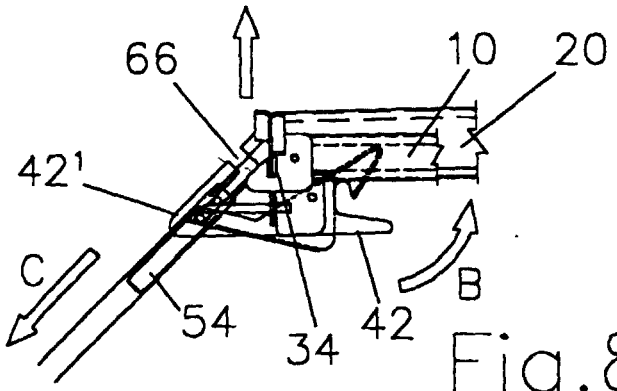


Fig.8

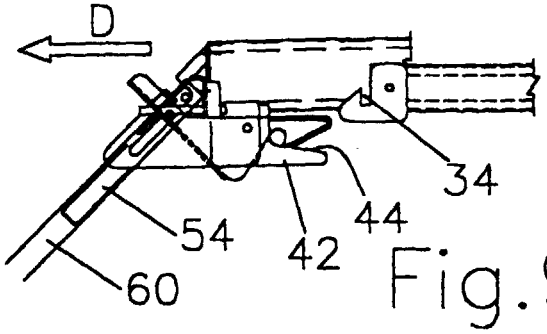


Fig.9

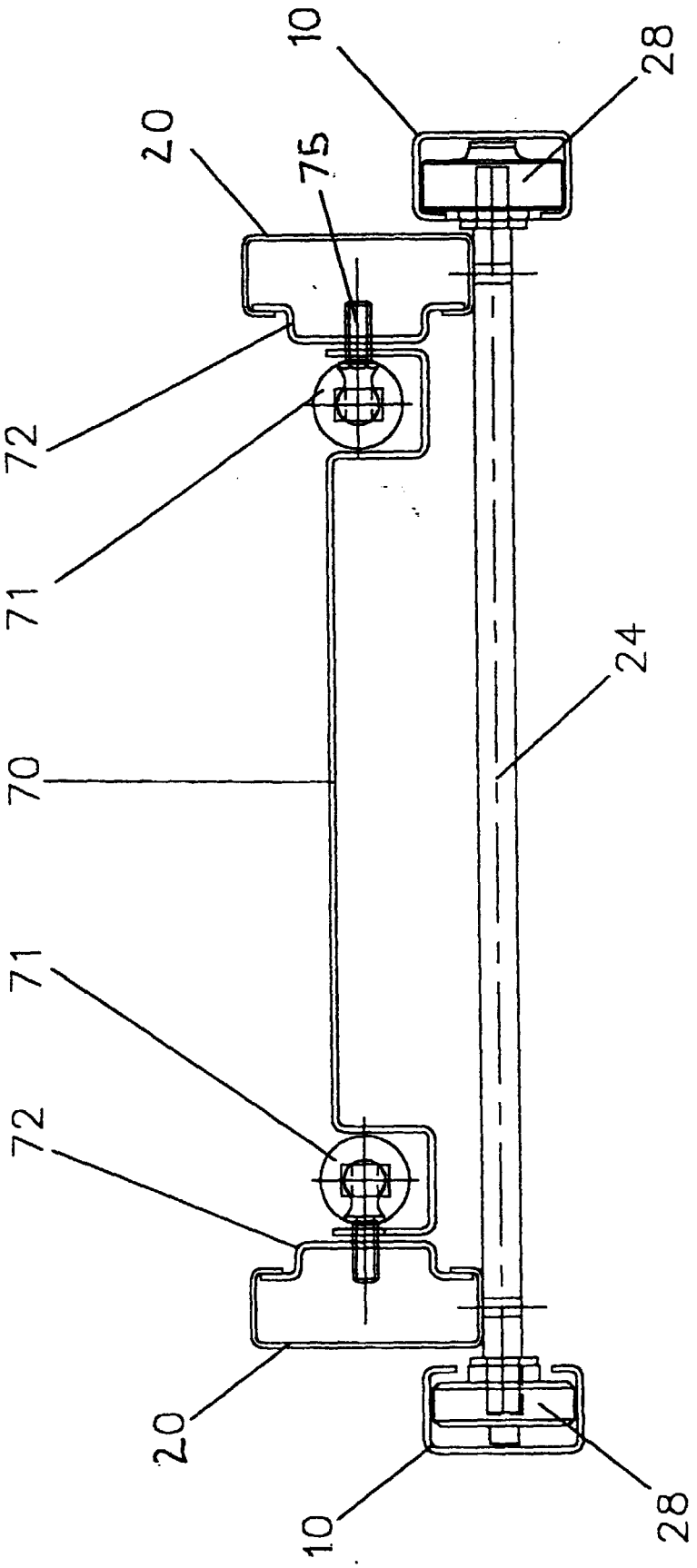


Fig.10

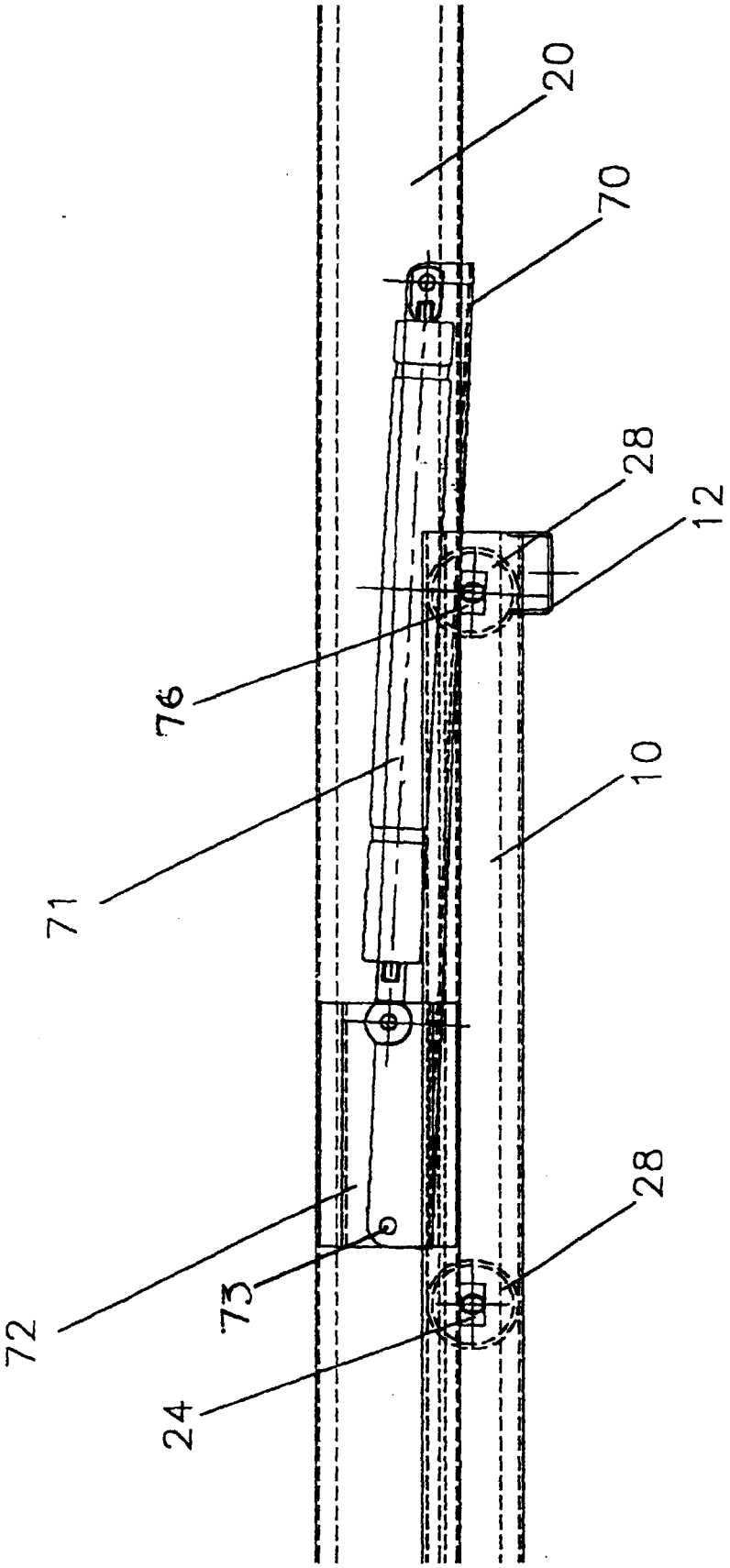
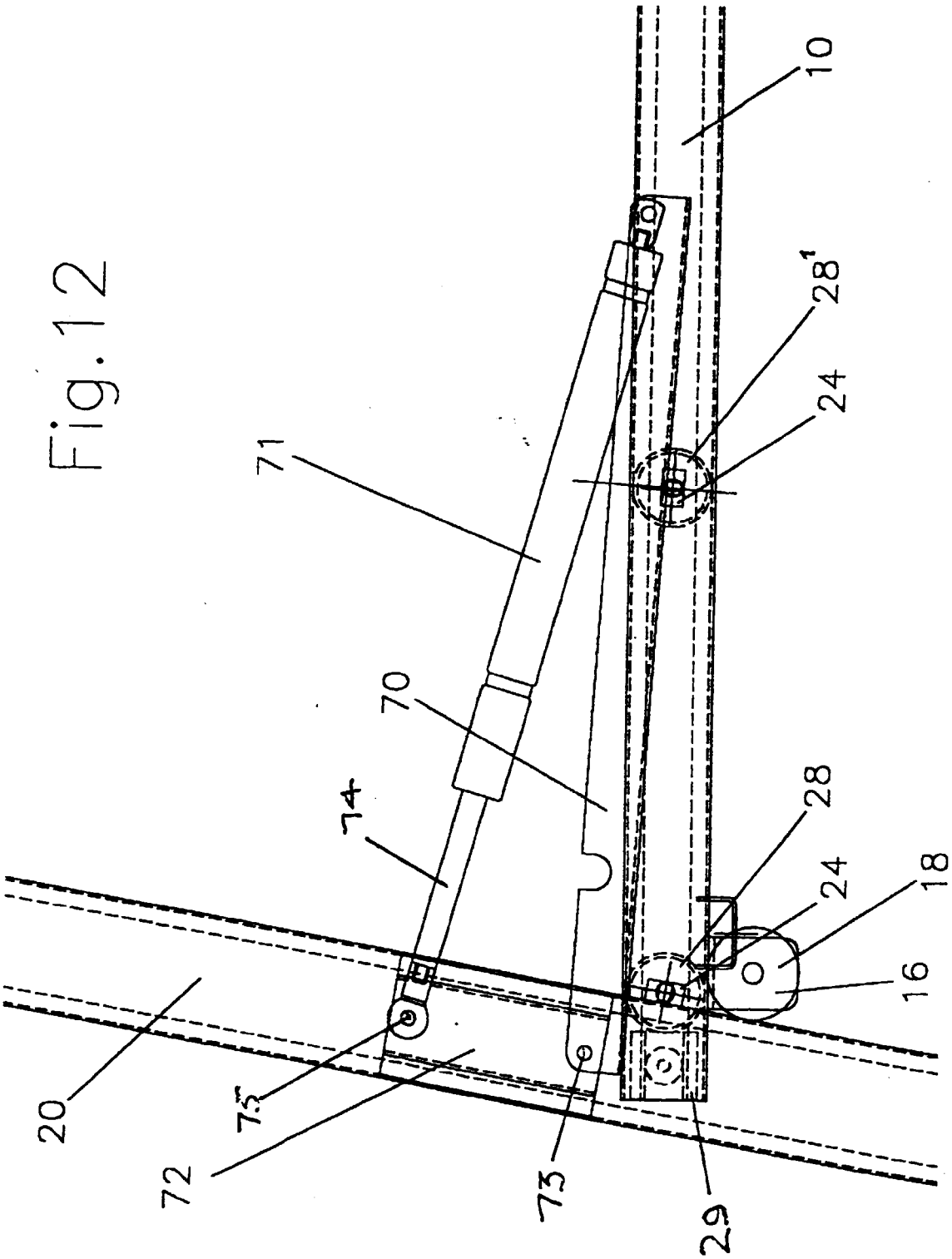


Fig. 11

Fig.12



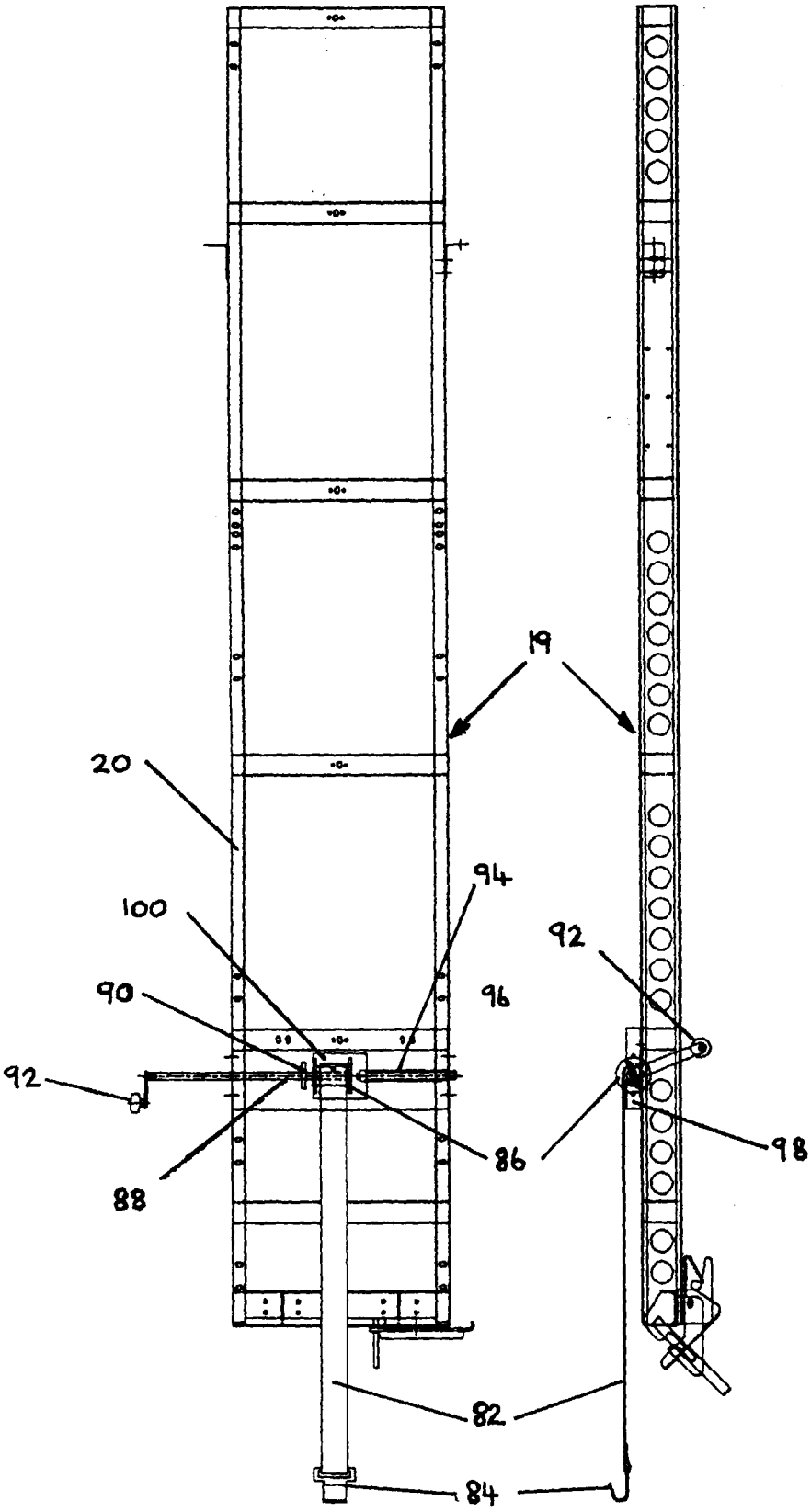


Fig. 13 Fig. 14

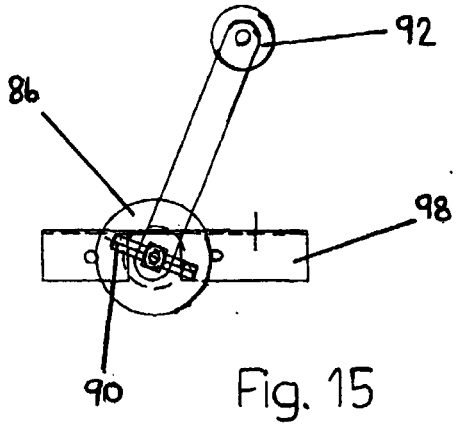


Fig. 15

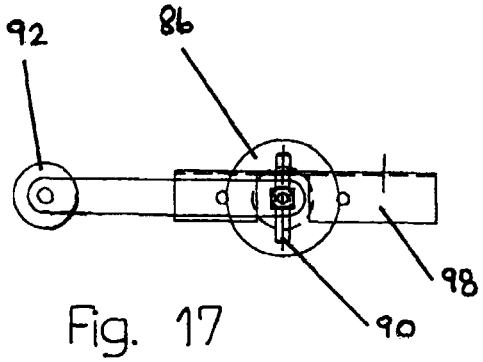


Fig. 17

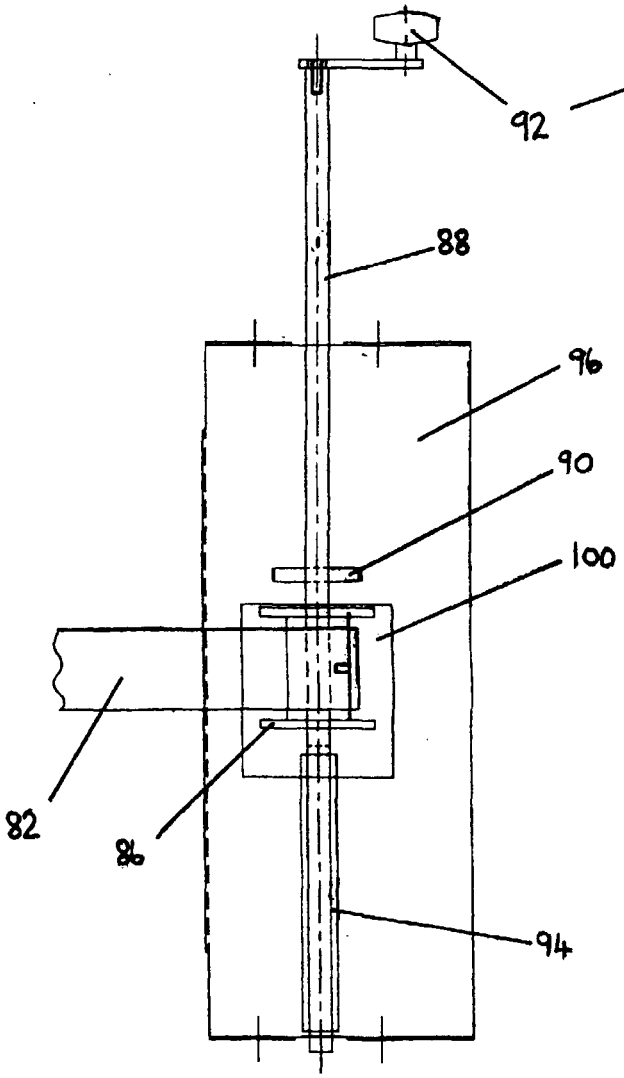


Fig. 16

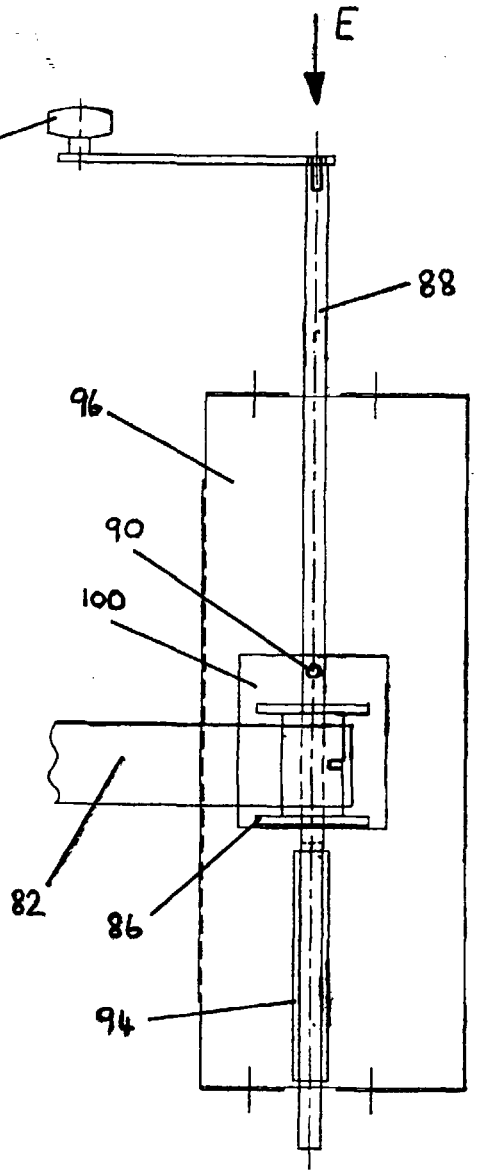


Fig. 18

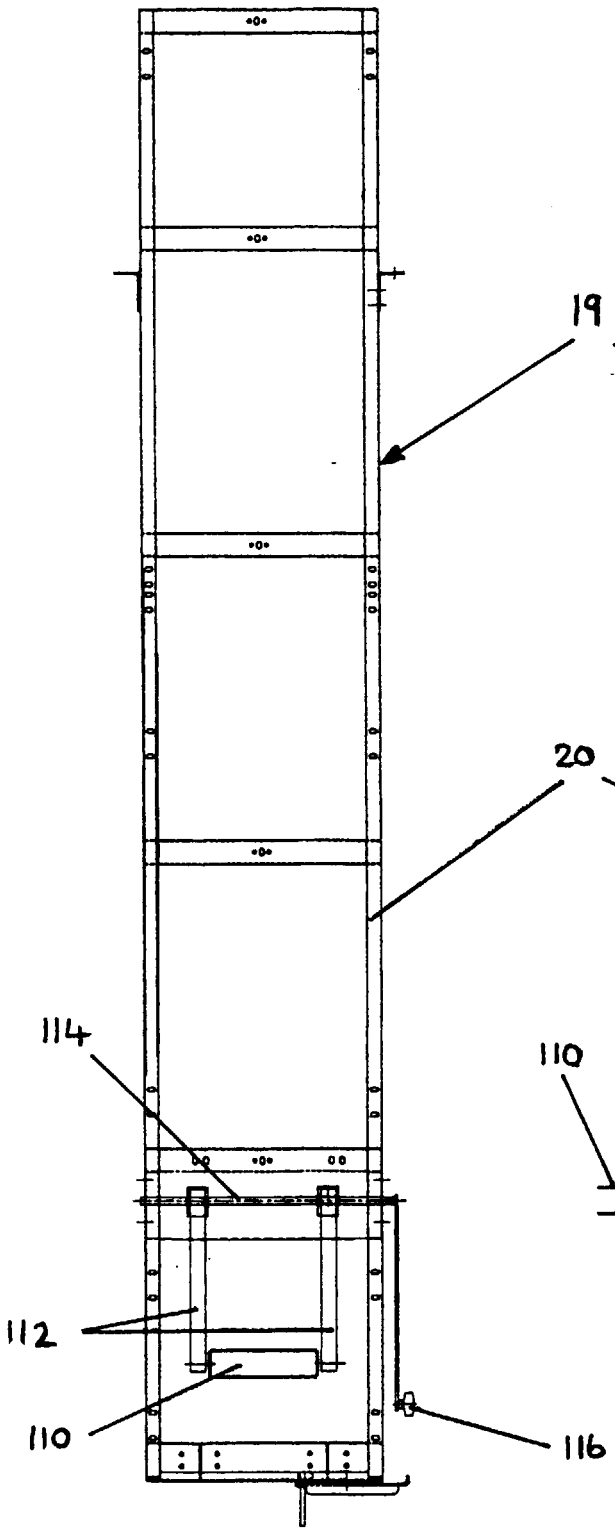


Fig. 19

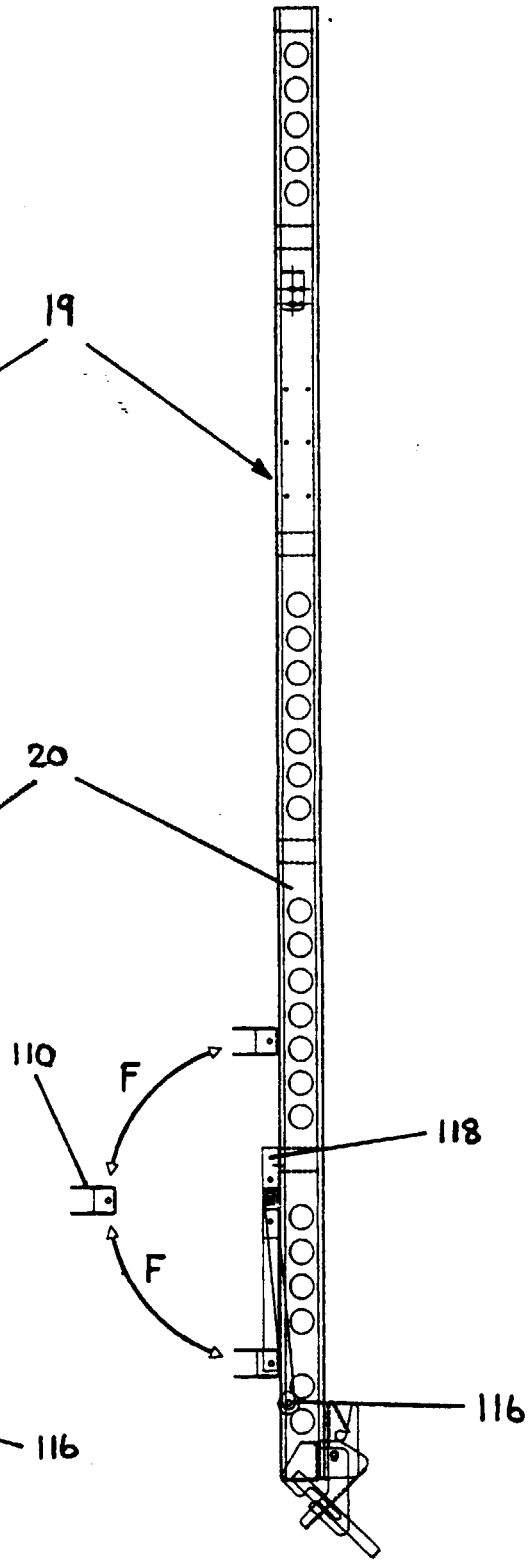


Fig. 20

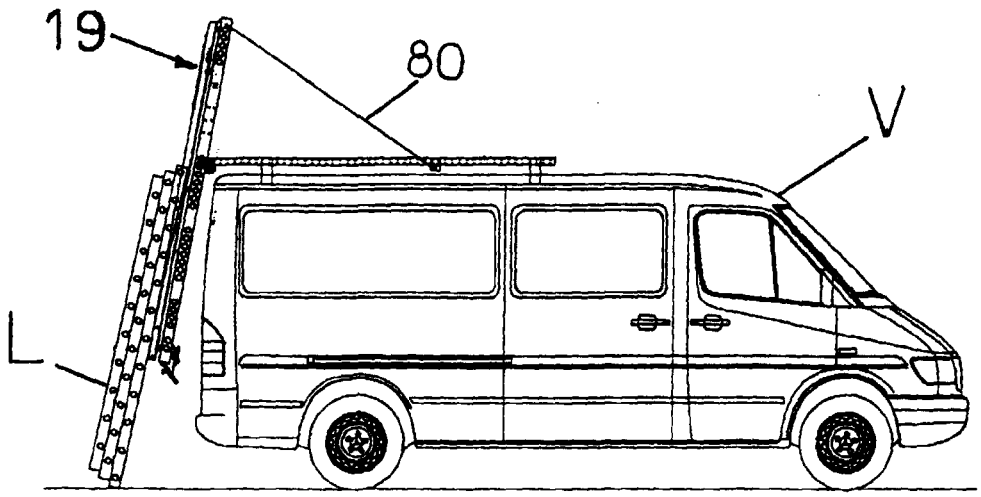


FIG 21a

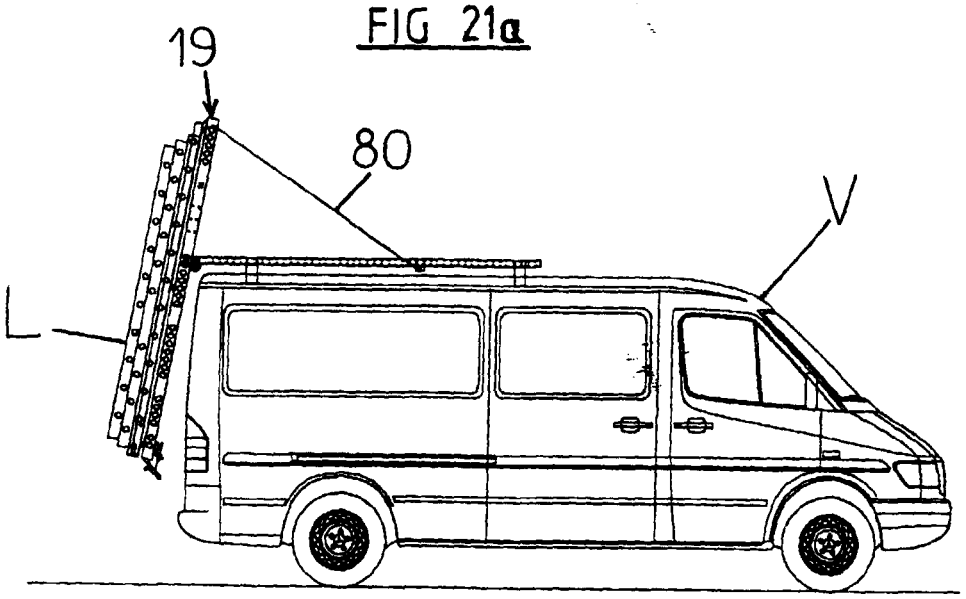


FIG 21b

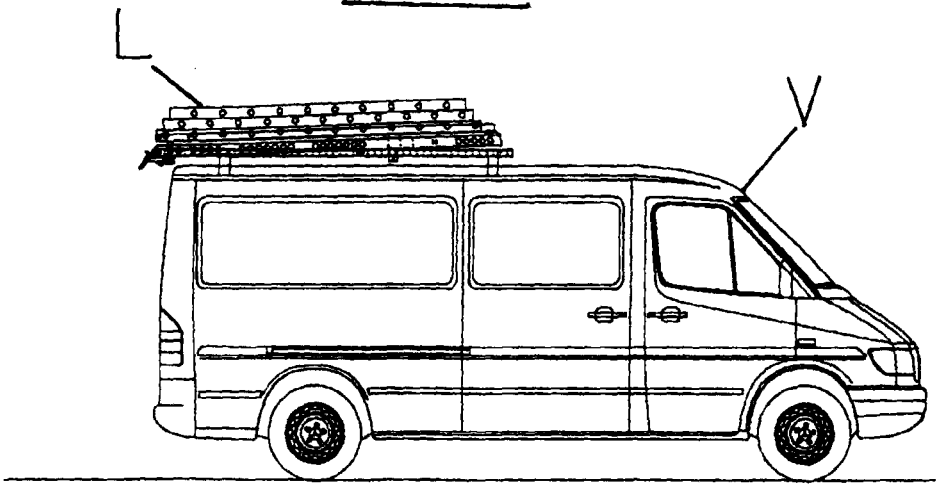


FIG 21c

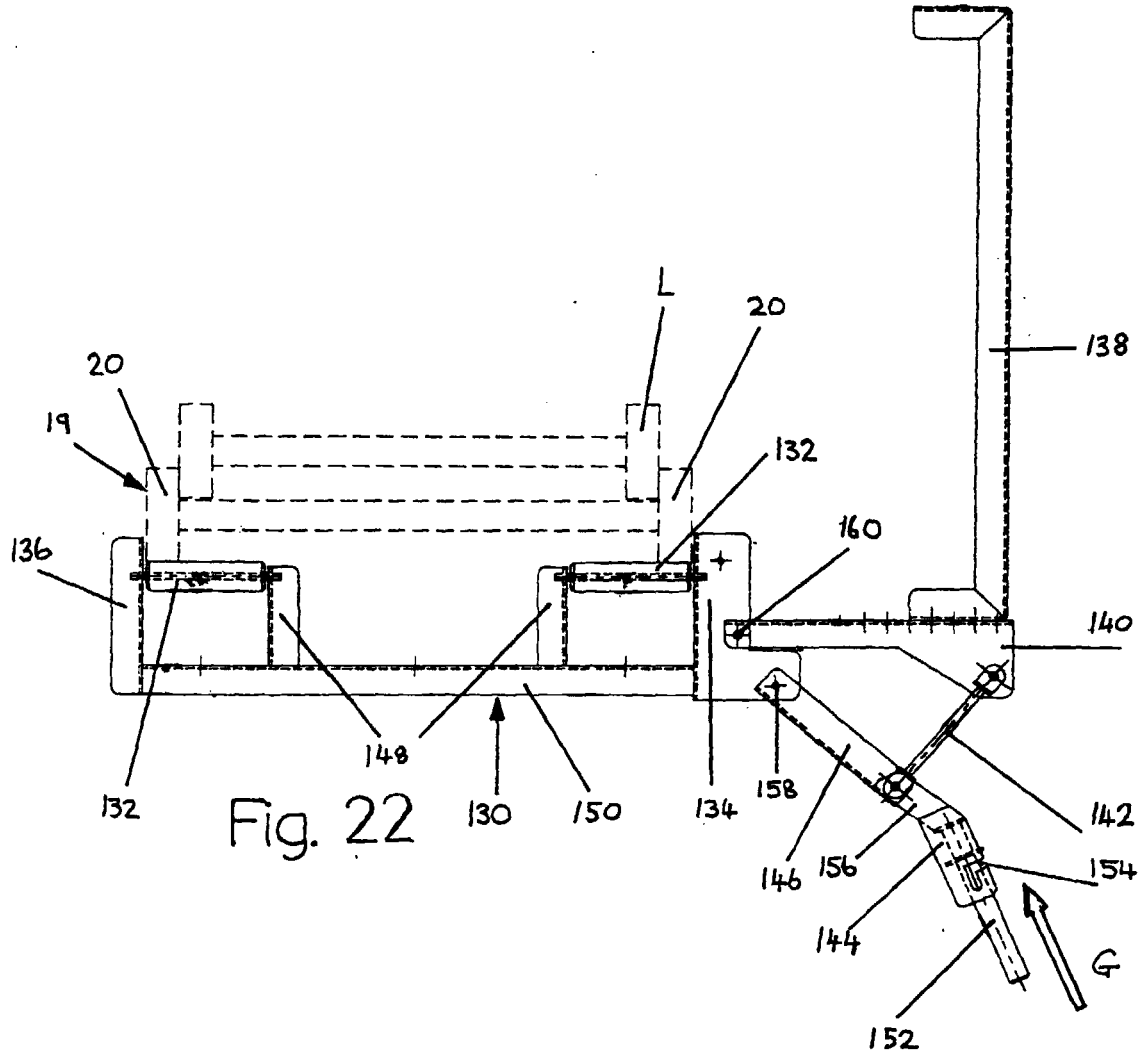

L
20
20
19
138
132
160
136
140
148
130
150
134
158
132
142
146
156
154
144
G
152

Fig. 22

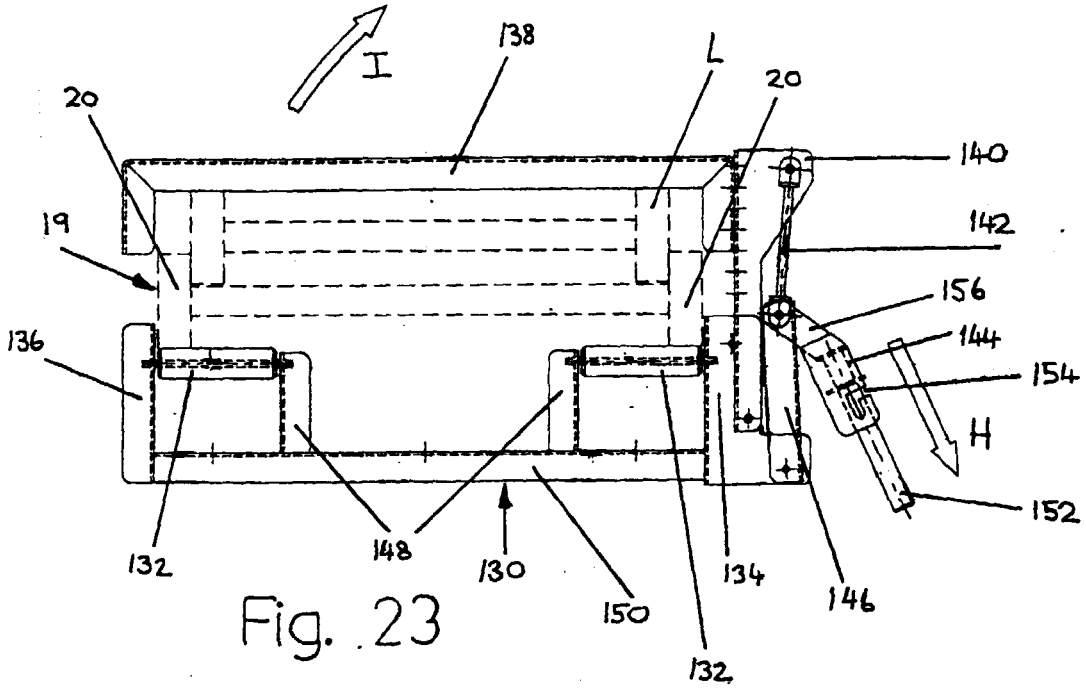

I
138
L
20
20
140
19
142
156
144
136
154
H
152
148
130
150
134
146
132
132

Fig. 23